

## 4. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

### 4.1 PRODUCTION

Carbon tetrachloride is produced by exhaustive chlorination of a variety of low molecular weight hydrocarbons such as carbon disulfide, methanol, methane, propane, and ethylene dichloride (CEH 1985; IARC 1979). It is also produced by thermal chlorination in the production of tetrachloroethylene. Since the U.S. Food and Drug Administration banned the sale of carbon tetrachloride in any product used in the home, its production initially declined at approximately 8% a year from 1974 to 1981 (HSDB 1992). From 1981 to 1988 the United States consistently produced between 573-761 million pounds (260,000-350,000 metric tons) of carbon tetrachloride per year (C&EN 1992; SRI 1988; USITC 1986). Carbon tetrachloride production dropped to 413 million pounds (187,000 metric tons) per year in 1990, and to 315 million pounds (143,000 metric tons) in 1991 (C&EN 1992, 1993; USITC 1986, 1991). Carbon tetrachloride is currently manufactured at five facilities in the United States: Akzo Chemical, Inc., New York, New York; Dow Chemical Company, Midland, Michigan; Vulcan Materials Company, Birmingham, Alabama; Occidental Chemical Corporation, Dallas, Texas; and LCP Chemicals, West Virginia Inc., Moundsville, West Virginia (USITC 1991; HSDB 1992).

This recent decline in production is due to the adoption of an international agreement (the Montreal Protocol) to reduce environmental concentrations of ozone-depleting chemicals (including carbon tetrachloride), and to the provisions of Title VI of the Clean Air Act Amendments of 1990 addressing these chemicals. The most recently proposed regulation requires reduction to 15 % of 1989 production levels by 1995 and a complete phaseout of carbon tetrachloride production for nonfeedstock uses by 1996. The EPA allocated a baseline production allowance of about 138 million pounds (63,000 metric tons) of carbon tetrachloride, apportioned among the eight U.S. companies producing the chemical in 1989 (EPA 1991). This allowance is based on the amount of chemical produced that was not used and entirely consumed in the manufacture of other chemicals for commercial purposes (EPA 1991), and is the 1989 production level against which all required phaseout reductions will be measured. Carbon tetrachloride production for those feedstock operations in which it is totally consumed will not be directly affected.

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The magnitude of the effect of this scheduled phaseout on total carbon tetrachloride production is uncertain, since the Halogenated Solvents Industry Alliance estimates that only about 3 % of the chemical manufactured in the U.S. is used in nonfeedstock applications (EPA 1991). Nevertheless, since the major current use of carbon tetrachloride is in the production of chlorofluorocarbons (see Section 4.3), and production of these chemicals has dropped significantly in recent years (C&EN 1993) and is also scheduled for phase-out by 1996, a significant reduction in carbon tetrachloride production is expected during this decade.

**4.2 IMPORT/EXPORT**

As a result of the recent trend toward decreased manufacturing of carbon tetrachloride, imports have increased and exports have tended to decrease. In 1984, imports were 26,000 metric tons (up from 1,000-4,000 metric tons in previous years), and exports were 12,000 metric tons (down from 39,000 metric tons in previous years) (CEH 1985). No information was located on current import or export quantities. Table 4-1 summarizes information on U.S. companies that reported the production, import, or use of carbon tetrachloride for the Toxics Release Inventory (TRI) in 1990 (TRI90 1992). The TRI data should be used with caution since only certain types of facilities are required to report. This is not an exhaustive list.

**4.3 USE**

The major current use of carbon tetrachloride is in the production of chlorofluorocarbons, such as dichlorodifluoromethane (F-12) and trichlorofluoromethane (F-11), that are used primarily as refrigerants (CEH 1985). In the past, carbon tetrachloride found a variety of other uses in industry, in medicine, and in the home. In the early part of this century, carbon tetrachloride was taken by mouth as a treatment for intestinal worms (Hall 1921), and it was also used briefly as an anesthetic (Hardin 1954). Because carbon tetrachloride is a solvent, it has been widely used as a cleaning fluid in the home and as a degreaser in industry. Because it is nonflammable, it was also used in fire extinguishers. Until recently, it was used as solvent in some household products, and as a fumigant to kill insects in grain. It has been estimated that 28 million pounds of carbon tetrachloride were used as a fumigant in 1978 (Daft 1991). Because of the toxicity of carbon tetrachloride, consumer and fumigant uses have been discontinued, and only industrial uses remain (SRI 1988; HSDB 1992).

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TABLE 4-1. Facilities That Manufacture or Process Carbon Tetrachloride<sup>a</sup>

State <sup>b</sup>	Number of facilities	Range of maximum amounts on site in thousands of pounds <sup>c</sup>	Activities and uses <sup>d</sup>
AL	4	10-49,999	1, 4, 5, 11
AR	2	10-99	7, 11
CA	8	0-49,999	1, 3, 4, 5, 7, 8, 11, 12, 13
CO	1	1-9	1, 5, 11
DE	1	100-999	7
GA	2	0-0.09	8, 9, 12
IL	3	10-9,999	7, 11
IN	2	10-99	1, 5, 6, 11
KS	5	10-9,999	1, 3, 4, 7, 11
KY	6 (1) <sup>e</sup>	10-9,999	1, 3, 5, 7, 10, 11, 13
LA	16	0-49,999	1, 3, 4, 5, 6, 7, 11, 12, 13
MD	1	10-99	7
MI	2	10-999	7, 11
MN	2	1-99	11, 13
MO	2	10-99	13
MS	2	0.1-99	11, 13
MT	1	0.1-0.9	11
ND	1	10-99	11
NJ	4	0-9,999	3, 7, 8, 9, 11
NY	1 (1) <sup>e</sup>	No Data	11
OH	6	1-999	1, 5, 10, 11, 12, 13
OK	2	10-99	11
PA	2	10-99	11
TN	2	1-999	11
TX	14	1-49,999	1, 4, 5, 6, 7, 8, 10, 11, 12, 13
VA	1	10-99	13
VI	1	10-99	11
WV	2	0.1-999	1, 4, 6
WY	1	1-9	11

<sup>a</sup>Derived from TRI90 (1992)<sup>b</sup>Post office state abbreviations<sup>c</sup>Data in TRI are maximum amounts on site at each facility.<sup>d</sup>Activities/Uses:

- |                               |                                  |
|-------------------------------|----------------------------------|
| 1. produce                    | 8. as a formulation component    |
| 2. import                     | 9. as an article component       |
| 3. for on-site use/processing | 10. for repackaging only         |
| 4. for sale/distribution      | 11. as a chemical processing aid |
| 5. as a byproduct             | 12. as a manufacturing aid       |
| 6. as an impurity             | 13. ancillary or other use       |
| 7. as a reactant              |                                  |

<sup>e</sup>Number of facilities reporting "no data" regarding maximum amount of the substance on site.

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Since production of carbon tetrachloride for most remaining uses is scheduled for phase-out over the next several years (see Section 4.1), the chemical will only be available for those uses for which no effective substitute has been found.

**4.4 DISPOSAL**

Carbon tetrachloride and waste containing carbon tetrachloride are classified as hazardous wastes by EPA. Generators of waste containing this contaminant must conform to EPA regulations for treatment, storage and disposal (see Chapter 7). Rotary kiln or fluidized bed incineration methods are acceptable disposal methods for these wastes (HSDB 1993).

Raw and treated waste water from metal manufacturing, paint and ink formulation, and rubber processing industries has been found to contain some carbon tetrachloride (USEPA Verification Program). Manufacturing distillation bottoms are typically incinerated.

According to the TRI, 1,079,478 pounds of carbon tetrachloride were transferred to landfills and/or other treatment/disposal facilities and 42,049 pounds were sent to publicly owned treatment works in 1990 (TRI90 1992) (see Section 5.2).